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CANDIDATE NATURAL AREAS

VOL. 3

1. Taylor, W. & Randall,D.C. Ecological survey of the vegetation of the Cub Creek watershed, Lassen National Forest.

2. Sawyer, J.,Palmer,J. , Cope,E. Ecological survey of proposed Preacher Meadows research natural area Trinity County, Ca.

3. Sawyer,J.,Stillman,K., Stekel,P. Ecological survey of proposed Indian Creek Brewer Spruce Research Natural Area, Siskiyou County Cal.

4. Whipple,J.& Cope, E. Ecological Survey of a propsed Mt. Eddy Research Natural Area

5. Talley, S.N. Ecological Survey of the Sentinel Meadow Candidate Research Natural Area Inyo National Forest

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1. Griffin, James R., ECOLOGICAL SURVEY OF TEAKETTLE CREEK CANDIDATE RESEARCH NATURAL AREA, TEAKETTLE CREEK EXPERIMENTAL FOREST, SIERRA NATIONAL FOREST. 1975.

2. Keeler-Wolf, Todd, Keeler-Wolf, Virginia, A SURVEY OF SCIENTIFIC VALUES IN THE PROPOSED HOSSLKUS LIMESTONE RESEARCH NATURAL AREA, SHASTA-TRINITY NATIONAL FOREST. 1975.

3. Keeler-Wolf, Todd, Keeler-Wolf, Virginia, A SURVEY OF THE SCIENTIFIC VALUES OF THE PROPOSED LIMEKILN CREEK RESEARCH NATURAL AREA, MONTEREY RANGER DISTRICT, LOS PADRES NATIONAL FOREST. 1977.

4. Keeler-Wolf, Todd, Keeler-Wolf, Virginia, A SURVEY OF SCIENTIFIC VALUES OF THE PROPOSED WHIPPOORWILL FLAT RESEARCH NATURAL AREA, INYO NATIONAL FOREST, CALIFORNIA. 1976.

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2. Sawyer, J. O., Stillman, Kenneth, T. AN ECOLOGICAL SURVEY OF THE PROPOSED WILLIAMS POINT RESEARCH NATURAL AREA, SISKIYOU COUNTY, CALIFORNIA. [1977?]

3. Talley, Steven N., AN ECOLOGICAL SURVEY OF THE BABBITT PEAK CANDIDATE RESEARCH NATURAL AREA ON THE TAHOE NATIONAL FOREST. 1977.

4. Talley, Steven N., AN ECOLOGICAL SURVEY OF THE BOURLAND MEADOW CANDIDATE RESEARCH NATURAL AREA ON THE STANISLAUS NATIONAL FOREST. 1976.

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Ecological survey of the vegetation of the Cub Creek watershed, Lassen National Forest, California

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(Purchase Order 1181-PSW-76)

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Abstract

Cub Creek is a low-order tributary stream of Deer Creek, draining the western slope of the Southern Cascades in Tehama County, California. The Cub Creek drainage is being considered for classification as a Research Natural Area by the Forest Service, U. S. Department of Agriculture. This report describes the ecological setting and characteristics of the Cub Creek watershed.

INTRODUCTION

The Cub Creek watershed is located in southeastern Tehama County, California, on the Lassen National Forest, Almanor Ranger District (See Map 1). Cub Creek is a tributary of Deer Creek, which drains into the Sacramento River in the upper Sacramento Valley.

Physiography. Cub Creek drains 1659 ha, ranging in elevation from 1136 m at the junction with Deer Creek to nearly 2000 m at its headwaters 1 km north of Humboldt Summit (See Map 2). The highest point on the basin rim is the unnamed summit on the northeast boundary at 2044 m. Cub Creek has a gradient of 111 m/km averaged over its 7 km length. The U. S. Geological Survey map for the area (15', Jonesville Quadrangle, 1958) indicates the slopes of the Cub Creek basin to be uniformly steep (25 - 40 °). We found, however, that the topography is more rugged than that indicated on the map. This rugged topography results from numerous cliffs of less than 20 m vertical relief, which form because of unequal weathering of the various layered volcanic flows in the basin. This topography does not appear on the 24,000 scale topographic maps.

Regional Climate:

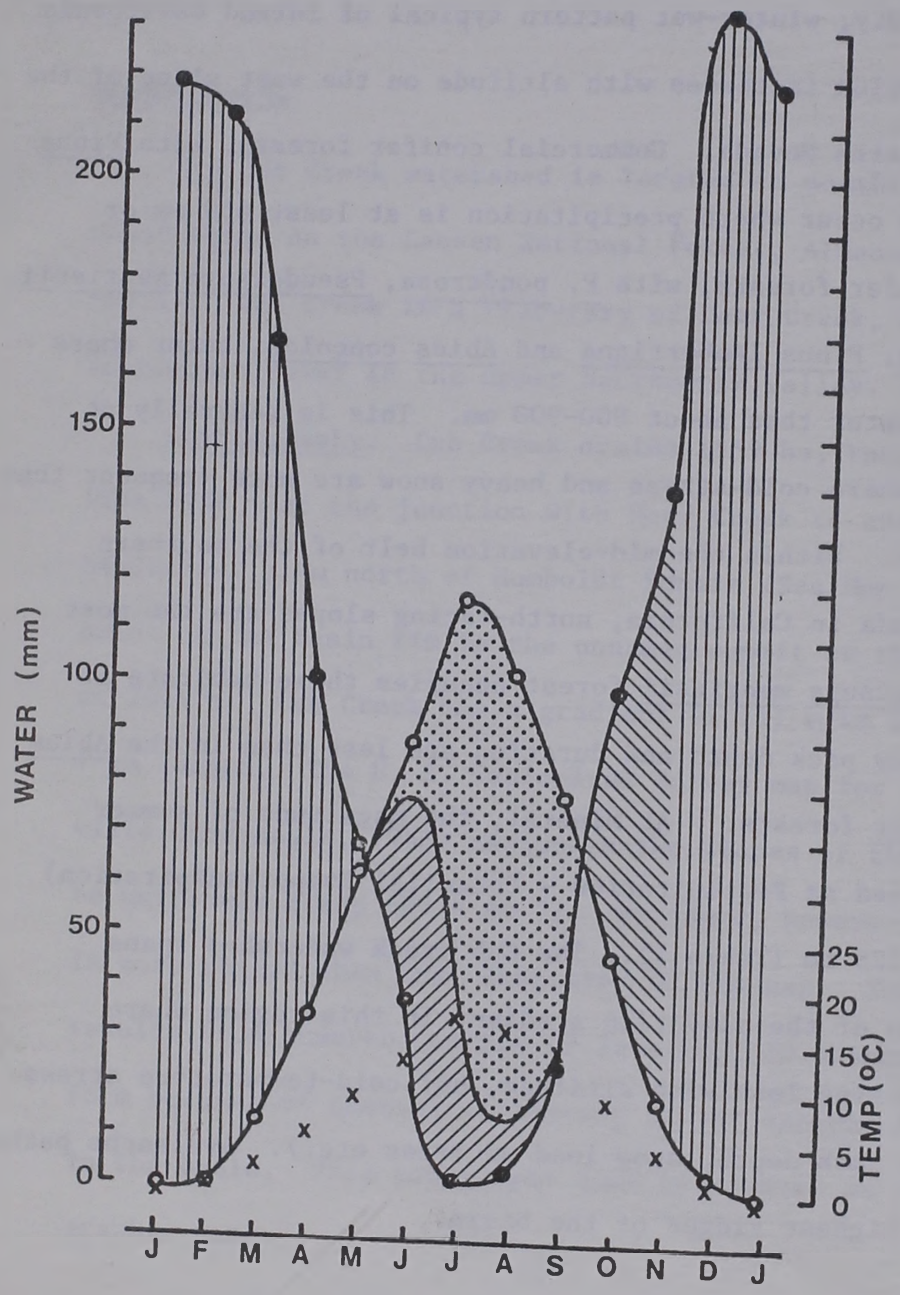
There is no recording weather station in the Cub Creek drainage or vicinity. The nearest comparable U. S. Weather Bureau station is located at Mineral, California (1478 m), 20 km to the north. Table 1 provides a climatic summary for this station, and a calculated seasonal water balance based on the Thornthwaite Model (a simple evapotranspiration model). A diagram showing this water balance model for Mineral is given below Table 1, and it shows the summer-dry, winter-wet pattern typical of inland California stations. Precipitation increases with altitude on the west slope of the southern Cascades-Sierra Nevada. Commercial conifer forests, with Pinus ponderosa, generally occur where precipitation is at least 650 mm or greater. Mixed-conifer forests, with P. ponderosa, Pseudotsuga menziesii, Calocedrus decurrens, Pinus lambertiana and Abies concolor, occur where precipitation is greater than about 800-900 mm. This is generally at higher elevations, where cold-stress and heavy snow are more frequent than in P. ponderosa forests. Within the mid-elevation belt of the southern Cascades-Sierra Nevada in California, north-facing slopes are the most mesic sites. Pseudotsuga menziesii forest occupies these habitats at elevations where snow pack depth and duration are less than in the Abies magnifica-A. concolor forests. At Mineral, the magnitude of summer water deficit (defined as Precipitation - Potential Evapotranspiration) is on the order of 225 mm (Table 1). The Cub creek watershed spans the critical portion of the elevation gradient in this region where water stress is becoming less with altitude, but cold-temperature stress is increasing (Snow pack depth, snow load on trees etc.). Avalanche paths are evident on the highest ridges of the basin.

TABLE 1

Mineral, California; Mean Monthly Water Balance

[Based on Thornthwaite (1948) Ann. Assoc. American Geographers]

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temp	-0.8	0.2	2.3	5.6	9.3	13.2	17.2	16.2	14.0	9.1	4.0	0.9	7.6 °C
PET	0	1	14	35	64	89	118	103	79	48	19	4	573 mm
Ppt	219	212	168	101	69	38	2	4	25	99	139	233	1309 mm
SStg	100	100	100	100	100	59	18	7	4	56	100	100	mm
AET	0	1	14	35	64	79	43	16	28	48	19	4	350 mm
Def						11	74	87	51				223 mm
Surp	219	210	154	66	5					0	76	228	958 mm



Temp = Temperature °C
PET = Potential Evapotranspiration mm.
Ppt = Precipitation mm.
SStg = Soil Water Storage in mm.
AET = Actual Evapotranspiration mm.
Def = Water Deficit mm.
Surp = Water Surplus mm.

Potential Evapotranspiration

Precipitation

x x Temperature

Water Surplus

Water Deficit

Soil Moisture Utilization

Soil Moisture Recharge

Soils and Geology.

The entire watershed of Cub Creek is underlain by Tertiary (Pliocene) volcanic rocks. Geological investigations and small-scale mapping have been concentrated at nearby Mt. Lassen and vicinity. Detailed work has not been undertaken in the area of Cub Creek. Soil development is variable within the basin (See aerial photo). Vertical cliffs are mostly composed of breccia (blocky mud-flows), and where capped by resistant andesite, unforested rock outcrops are extensive, as on the lower slopes of the south-facing side of the basin (See aerial photo). In general, soil depth is greatest within the basin on the northeast-facing slope, and higher up on the southwest-facing slope. The Cub Creek watershed has not been included within any comprehensive soil surveys, so series within the area have not been described.

Vegetation.

The proposed Cub Creek RNA includes both old growth and young stands of Pacific Ponderosa Pine-Douglas Fir (SAF 244), Ponderosa Pine-Sugar Pine-Fir (SAF 243) and Red Fir (SAF 207). Extensive young stands of Abies concolor occur, as well as montane chaparral in various stages of succession to conifer forest. Small mature stands of A. concolor are to be found, as are A. magnifica mixed with A. concolor stands. Shallow soil sites, on ridgetops and elsewhere, support several herbaceous plant associations. Meadows with grasses and sedges are not extensive. Most of the forested terrain is steep, from 20-45 ° slopes. Very little conifer forest occurs on flat sites, and those that are present are small. Table 2 provides an estimate of the relative importance of the major types. Vegetation Type Map coverage is not available, but a timber type map is reproduced here as Map 3.

TABLE 2

Importance of generalized vegetation types in the Cub Creek basin. Types were estimated from aerial photography and Map 3.

VEGETATION TYPE	% of total area
Pacific Ponderosa Pine-Douglas Fir (SAF 244)	4 %
Ponderosa Pine-Sugar Pine-Fir (SAF 243)	23 %
young White Fir (SAF 211)	27 %
Montane Chaparral	25 %
Red Fir (SAF 207)	8 %
Rocky herbaceous communities	12 %
Meadows	1 %

SURVEY METHODS

We visited the Cub Creek basin on 7-10 July 1976. The 7th, 8th and 9th were spent in the lower reaches of Cub Creek, and the 10th was spent in the headwaters of the basin. Judging from inspection of aerial photos of the area, we visited all major habitat types. The 231 plant species seen or collected in the vicinity of the Cub Creek basin are listed in the Species List. For characterization of the vegetation of the area, we sampled 23 plots. These plots were sampled from the range of habitat types in the area. Each plot was located in an area of homogeneous plant cover. All species within the confines of a plot were listed, and their cover estimated. On plots where tree data were collected, we used a tape to establish a circular area of variable radius for a plot. Plot radius was subjectively chosen so as to include a large, homogeneous representation of the tree stand being sampled. Diameter at breast height was recorded for all live stems greater than 1 cm dbh. Location of the 8 tree plots sampled is shown on Map 3.

VEGETATION TYPES

Table 3 is an association table we constructed from the plot data collected. On the left side of the table are groups of species which occur in association. The 23 plots sampled are given across the top of the table. The values entered in this tabular matrix are:

R =	Rare in plot	3 =	25-50 % cover
+ =	less than 1% cover	4 =	50-75 % cover
1 =	1-5 % cover	5 =	greater than 75 % cover
2 =	5-25 % cover		

Six plant communities can be recognized within the Cub Creek basin based on the arrangment of this table. These communities are defined by the presence/absence of the groups of species characterizing a particular kind of habitat. These communities are indicated in the table by horizontal lines. They are:

A Pseudotsuga menziesii-Cornus nuttallii community

B Pinus ponderosa-Pseudotsuga menziesii-Calocedrus decurrens community

C Arctostaphylos patula-Quercus vaccinifolia community

D Abies magnifica-Abies concolor-Pinus monticola community

E Sitanion hystrix-Chrysothamnus nauseosus community

F Carex microptera-Glyceria striata community

TABLE 3

Plot	A			B						C		D				E						F	
	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B	C U B
	8	5 3	7	2	2 1	4	5	1	1 2	1 0	1 8	1 6	1 7	1 3	2 0	9	3	6	1 4	1 9	1 5	5 1	1 1
ELEVATION ABOVE 1000 m CONTOUR	405	76	374	223	508	309	414	214	737	795	998	894	908	758	305	862	377	371	840	921	837	740	725
SLOPE	30°	20°	30°	27°	30°	8°	20°	25°	18°	15°	20°	40°	25°	17°	22°	12°	8°	10°	8°	17°	20°	10°	14°
EXPOSURE	NE	NNE	NNE	WNW	SE	SSW	WSW	WNW	E	SSW	ESE	NNW	WNW	NNW	SSW	WNW	WNW	WSW	NNW	ESE	SE	NW	W
Abies concolor	5	1	3	1	1	2	3	1	3	1	1	1	2	4	5	+	.	.	.	.	.	.	.
Quercus kelloggii	+	1	R	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cornus nuttallii	1	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acer macrophyllum	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Goodyera oblongifolia	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pteridium aquilinum pubescens	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Disporum hookeri trachyandrum	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Corallorhiza maculata	+	+	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.
Trientalis latifolia	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asarum hartwegii	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chimaphila umbellata occidentalis	+	.	+	+	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.
Pseudotsuga menziesii	1	3	2	2	1	2	3	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calocedrus decurrens	.	2	2	1	3	+	2	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pinus lambertiana	.	.	1	.	1	3	2	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Pinus ponderosa	.	.	.	2	3	3	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quercus chrysolepis	.	.	.	2	.	+	+	3	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.
Bromus marginatus	.	+	.	.	+	+	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Polygala cornuta	.	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.
Viola lobata	.	.	+	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pedicularis densiflora	.	.	+	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Iris hartwegii	.	.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex multicaulis	.	.	.	+	+	.	.	+	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Arceuthobium campylopodium	.	.	.	.	+	+	+	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Hieraceum albiflorum	.	.	.	.	+	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Gallium bolanderi	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Arctostaphylos patula	.	.	.	2	.	.	.	3	1	3	2	.	.	.	.	.	+	4	.	.	.	.	.
Ceanothus integerrimus	.	R	.	.	1	.	.	+	+	3	3	.	.	.	.	.	.	.	.	.	.	.	.
Quercus vaccinifolia	.	.	1	.	.	.	R	.	1	3	3	2	+	+	.	.	.	.	.	+	.	.	.
Smilacina racemosa amplexicaulis	.	+	.	.	.	.	.	.	+	+	+	+	+	+	+	.	.	.	.	.	.	.	.
Penstemon gracilentus	.	.	.	.	.	.	.	.	+	.	+	+	.	+	+	.	.	.	.	.	.	.	.
Monardella odoratissima pallida	.	.	.	.	.	.	.	.	+	.	+	+	1	.	.	+	.	.	+	+	+	.	.
Arctostaphylos nevadensis	.	.	.	.	.	.	.	.	.	.	2	1	2	.	.	.	.	.	.	.	.	.	.
Ribes viscosissimum hallii	.	.	.	.	.	.	.	.	.	.	+	1	+	.	.	.	.	.	.	.	.	.	.
Chrysopsis breweri	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.
Abies magnifica	.	.	.	.	.	.	.	.	+	.	.	3	4	3	.	R	.	.	.	R	.	.	.
Pinus monticola	.	.	.	.	.	.	.	.	.	.	.	2	+	.	R	.	.	.	.	.	.	.	.
Acer glabrum	.	.	.	.	.	.	.	.	.	.	+	2	2	+	.	.	.	.	.	.	.	.	.
Pyrola picta	.	.	.	.	.	+	.	.	.	.	.	+	+	+	+	.	.	.	.	.	.	.	.
Chimaphila menziesii	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.
Penstemon laetus	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.
Phacelia frigida dasyphylla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.
Calyptridium umbellatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	1	.	.	.	.
Sitanion hystrix	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	+	+	2	+	1	.	.
Chrysothamnus nauseosus albicaulis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	+	2	.	.
Eriophyllum lanatum integrifolium	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	.	.
Artemisia arbuscula	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.
Leptodactylon pungens hookeri	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.
Calochortus leichtlinii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.
Sanicula tuberosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.
Phlox diffusa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Pteryxia terebinthina californica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.
Allium platycaule	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.
Galium hypotrichium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Eriogonum microthecum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
Penstemon deustus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
Collomia tinctoria	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
Eriogonum ursinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex microptera	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2
Glyceria striata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	4
Veratrum californicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
Muhlenbergia filiformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
Deschampsia elongata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Mimulus primuloides pilosellus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
Sagina saginoides hesperia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
Hypericum anagalloides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
Taraxacum officinale	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+
Epilobium oregonense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
Mimulus nuttatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Trifolium longipes	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
Veronica americana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Viola adunca	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Conifer Forests.

A. Pseudotsuga menziesii-Cornus nuttallii community

This community roughly corresponds to the Pacific Ponderosa Pine-Douglas Fir type (SAF 244). Pseudotsuga menziesii is the canopy dominant, along with Abies concolor, Calocedrus decurrens, Cornus nuttallii, Quercus kelloggii and Acer macrophyllum. This type is not well represented in the Cub Creek watershed, being found only on the lower slopes of the area. This is the forest vegetation typical of much of the northeast-facing slopes in the canyon of Deer Creek. This forest vegetation is the most mesic of the southern Cascades-Sierra Nevada, with the typical riparian Acer and Cornus occuring on slopes away from watercourses. We only sampled one tree stand we consider representative of this type. Summary of the data collected from this stand is given below in Table 4.

TABLE 4

Data for Plot S3

Species	Basal Area (m^2/ha)	Density (#/ha)	Rel. Domin.	Rel. Dens.	Importance Value	Stem Diam. ($\bar{X} \pm$ S.D.) cm
Pseudotsuga menziesii	32.1	392.9	37.2	25.6	62.9	18.5 ± 27.8
Cornus nuttallii	0.9	375.1	1.0	25.6	26.7	4.3 ± 3.5
Acer macrophyllum	1.1	39.2	1.2	2.5	3.8	--
Calocedrus decurrens	36.1	353.8	41.8	23.0	64.9	15.3 ± 37.4
Quercus chrysolepis	0.5	78.5	0.6	5.1	5.7	2.5 ± 2.1
Abies concolor	14.5	117.9	16.9	7.6	24.6	27.3 ± 35.2
Quercus kelloggii	1.2	157.9	1.4	10.2	11.7	9.7 ± 2.8

B. Pinus ponderosa-Pseudotsuga menziesii-Calocedrus decurrens community.

This community roughly corresponds to the Ponderosa Pine-Sugar Pine-Fir type (SAF 243), or the "mixed conifer forest" of common usage. Three of the tree plots sampled are representative of this type. Data from these plots is summarized in Table 5 (Page 12). Basal area ranged from 89 to 124 m^2/ha. Pinus ponderosa, Pseudotsuga menziesii, Pinus lambertiana, Calocedrus decurrens and Abies concolor are the canopy dominants. As can be seen in Table 3 (association table), Calocedrus decurrens is the only conifer species present in all stands of this type; Pseudotusga menziesii occurs in all but one, and Pinus ponderosa and P. lambertiana are found important in about half of the plots.

D. Abies magnifica-Abies concolor-Pinus monticola community

This community corresponds to the Red Fir type (SAF 207), and in part, to the White Fir Type (SAF 211). Four of the tree plots sampled were in this type. Data from these plots is listed in Table 6 on page 13. Basal area ranged from 56-123 m^2/ha, with Abies concolor, A. magnifica and Pinus monticola dominating the canopy. Observations in the Cub Creek watershed suggest that most of the montane chaparral in the area will follow a sucessional trend leading to this forest type. As can be seen on Table 3 (association table), some of the herbaceous species associated with brush are to be found in two of the plots of this type, although with reduced vigor.

TABLE 5
Summary of Plot data for mixed conifer stands sampled.

Species	Basal Area (m^2/ha)	Density (#/ha)	Rel. Dominance	Relative Dens.	Importance Value	Stem Diam. ($\bar{X}$ ± S.D.) cm
			Stand No. 4			
Pseudotsuga menziesii	7.6	41.4	6.1	5.0	11.2	31.0±45.9
Pinus lambertiana	63.9	82.2	51.3	10.1	61.4	98.8±12.5
Pinus ponderosa	51.1	246.6	41.7	30.5	72.2	48.6±18.4
Abies concolor	1.0	438.5	0.8	54.2	55.0	4.9±2.8
			Stand No. 5			
Pseudotsuga menziesii	38.6	135.4	43.1	12.9	56.0	52.8±30.8
Pinus lambertiana	2.6	33.8	2.9	3.2	6.1	29.5±14.8
Pinus ponderosa	18.4	118.5	20.6	11.2	31.9	42.5±13.9
Abies concolor	8.2	626.5	9.6	59.6	68.9	4.9±12.1
Calocedrus decurrens	21.4	135.4	24.0	12.9	36.9	42.0±16.9
			Stand No. 21			
Pseudotsuga menziesii	4.9	42.4	4.5	4.9	9.4	29.3±30.9
Pinus lambertiana	16.0	56.5	14.5	6.5	21.1	35.0±58.0
Pinus ponderosa	35.9	141.4	32.6	16.3	49.0	40.4±42.2
Abies concolor	4.2	537.5	3.8	62.2	66.1	4.6±9.6
Calocedrus decurrens	48.9	84.8	44.4	9.8	54.3	85.5±6.0
---Totals---						
Stand 4	124.5	808.5				
Stand 5	89.3	1049.9				
Stand 21	110.1	862.9				

TABLE 6

Summary of Plot data for the Abies magnifica-A. concolor-Pinus monticola type.

Species	Basal Area (m^2/ha)	Density (#/ha)	Rel. Dominance	Rel. Dens.	Importance Value	Stem Diam. ($\bar{X}$ ± S.D.)
			Stand No. 16			
Abies magnifica	9.6	169.5	17.2	47.3	64.5	19.5±19.7
Pinus monticola	43.9	131.8	78.0	36.8	114.8	58.7±30.5
Abies concolor	2.6	56.5	4.7	15.7	20.5	19.6±17.9
			Stand No. 13			
Abies magnifica	38.8	376.6	32.7	19.8	52.5	25.4±26.3
Abies concolor	74.7	1431.4	63.7	75.2	139.9	9.9±24.5
Pinus monticola	4.2	94.1	3.5	4.9	8.4	19.6±15.2
			Stand No. 17			
Abies magnifica	68.1	226.0	81.7	75.0	156.7	49.6±43.6
Abies concolor	15.2	56.6	18.2	18.7	36.9	47.3±42.1
Pinus monticola	0.5	18.8	0.1	0.1	0.2	---
			Stand No. 20			
Abies concolor	132.0	572.9	100.0	100.0	200.0	50.7±13.7
			---TOTALS---			
Stand 13	118.7	1902.3				
Stand 16	56.3	357.8				
Stand 17	83.3	301.3				
Stand 20	132.0	572.9				

Non-Forest Vegetation.

C. Arctostaphylos patula-Quercus vaccinifolia community.

This community is a seral brush association, and in most sites will trend towards forest. Arctostaphylos patula, Ceanothus integerrimus, and Quercus vaccinifolia dominate the vegetation, forming a closed shrub-canopy 1.0-1.5 m tall. At lower elevations within the Cub Creek basin, this community is essentially climax on some sites: very rocky, steep slopes or on shallow soil, flat rock outcrops. For the most part, however, the areas covered by this vegetation are undergoing succession to forest. Various stages in this succession at different altitudes can be found within the Cub Creek basin. The general trend in this succession appears to be dominance by Abies concolor and/or Abies magnifica.

E. Sitanion hystrix-Chrysothamnus nauseosus community.

This community occupies rocky or shallow soil sites at the highest elevations within the Cub Creek basin. These sites are dry and well drained, and probably have very little snow cover in winter because of wind exposure. The vegetation is composed of chiefly cold-desert species characteristic of the eastern Sierra and Great Basin.

F. Carex microptera-Glyceria striata community.

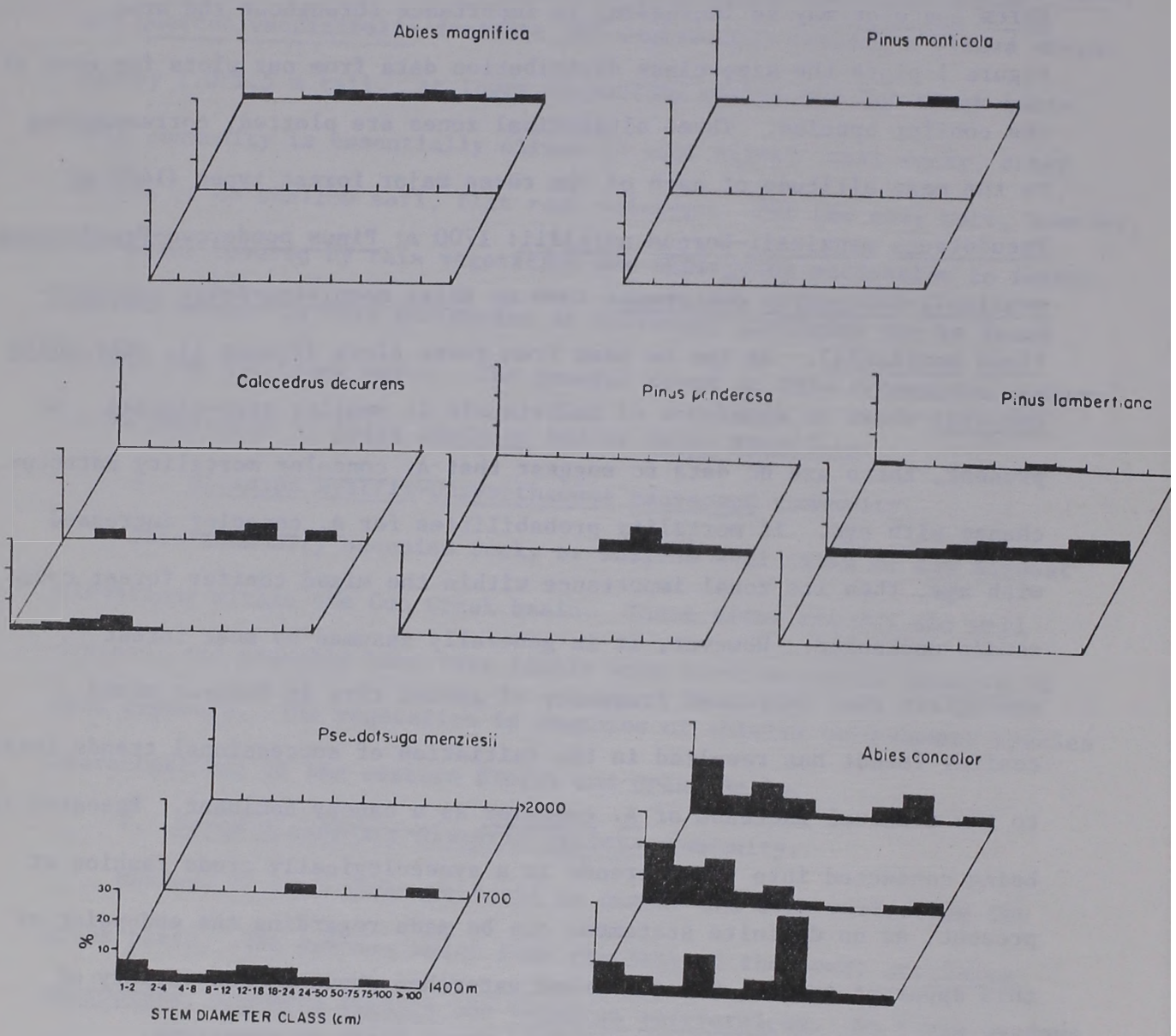
Meadows of this type are small in number and size within the Cub Creek basin. The species which form the bulk of the cover are Carex microptera, Glyceria striata and Veratrum californicum. No large meadows occur in the basin, those that are present are smaller than a few hundred m^2.

STATUS OF CONIFER FOREST WITHIN THE CUB CREEK WATERSHED

Successional trends may be evident in many of the old-growth stands within the Cub Creek basin. Viewing Table 3 (association table), it can be seen that Abies concolor occurs in all of the forest types in the basin. Abies concolor may be increasing in importance throughout the area. Figure 1 plots the size-class distribution data from our plots for each of the conifer species. Three altitudinal zones are plotted, corresponding to the mean altitude of each of the three major forest types (1400 m; Pseudotsuga menziesii-Cornus nutallii: 1700 m; Pinus ponderosa-Pseudotsuga menziesii-Calocedrus decurrens: 2000 m; Abies magnifica-Abies concolor-Pinus monticola). As can be seen from these plots (Figure 1), only Abies concolor shows an abundance of individuals in smaller size-classes. At present, there are no data to suggest that A. concolor mortality patterns change with age. If mortality probabilities for A. concolor increased with age, then its zonal importance within the mixed conifer forest could remain unchanged. However, it is generally assumed by most forest ecologists that decreased frequency of ground fire in Sierran mixed conifer forest has resulted in the initiation of successional trends leading to the eventual increase of A. concolor as a canopy dominant. Research is being conducted into these trends in a synecologically crude fashion at present, so no definite statement can be made regarding the end-point of this apparent trend. The Cub Creek watershed shows a wide variety of possible study sites for studies into these kinds of questions.

Looking at the aerial photo attached, areas mapped as WF2$\bar{-}$ of the Type Map overlay illustrate the extent of stands where Abies concolor is found in dense, young stands. Other conifers are found in this type, but in low densities, so they escaped notice on the type map. Stands of this type show evidence of past fire and/or brush dominance.

Figure 1. Size-class distribution for the conifer species in the Cub Creek basin. Three forest-elevation zones are plotted.



SUMMARY AND RECOMMENDATIONS

The Cub Creek watershed exhibits several characteristics which make it a good candidate for Research Natural Area status: 1) it is an entire watershed; 2) it encompasses a large area; 3) it represents an undisturbed example of several important forest cover types which are not well represented in present Region 5 RNA's. The investigators can list three disadvantages to the area: 1) slopes are steep and topography rugged, making movement within the basin difficult; 2) access from below, via Deer Creek, is limited to steep slopes; 3) although the area includes a wide range of elevations, the boundaries as presently drawn do not adequately represent the low-elevation Douglas-fir forests of the area.

The first two disadvantages are somewhat trivial if the status of the proposed RNA is considered from a broad viewpoint. If the area attracts sufficient research effort, trails could be constructed into the lower reaches of Cub Creek to facilitate the transportation of heavy or bulky research instruments. There is already a primitive road into the upper reaches of the drainage (visible on aerial photographs), which provides access to about the 6000-foot contour. This road could be maintained as necessary to facilitate research activities.

The remaining criticism of the area as proposed could be solved by minor boundary adjustments. If the slopes of the Deer Creek drainage adjacent to the area and to the east were included within the RNA boundaries, a significant increase in Douglas-fir acreage would result. This extension is shown on Map 2. The majority of

this area is marginal component; timber harvest would be very costly due to the very steep slopes (30-40°).

RARE AND ENDANGERED PLANT SPECIES

None of the vascular plant species observed in the Cub Creek watershed are endangered (cf. Federal Register 41: 24524-572). One taxon, Stipa stillmanii, is considered by the California Native Plant Society to be rare, but not threatened.

Species list for the Cub Creek drainage and vicinity. Number given to the right of each taxon is the page number in Munz and Keck on which it is referenced. * indicates introduced weed.

	1. ACERACEAE	
1	Acer glabrum	995
2	A. macrophyllum	996
	2. AMARYLLIDACEAE	
3	Allium campanulatum	1371
4	A. platycaule	1371
5	A. validum	1370
6	Brodiaea multiflora	1385
	3. ANACARDIACEAE	
7	Rhus diversiloba	998
	4. APOCYNACEAE	
8	Apocynum pumilum	451
9	Cycladenia humilis	450
	5. ARISTOLOCHIACEAE	
10	Asarum hartwegii	965
	6. ASPIDIACEAE	
11	Athyrium filix-femina var. californica	43
12	Cystopteris fragilis	43
13	Dryopteris arguta	42
14	Polystichum munitum var. imbricans	40
15	Polystichum scopulinum	41
	7. BETULACEAE	
16	Alnus rhombifolia	900
17	Corylus cornuta var. californica	899
	8. BORAGINACEAE	
18	Cryptantha affinis	572
19	Lithospermum californicum	559
	9. CAMPANULACEAE	
20	Campanula prenanthoides	1063

10. CAPRIFOLIACEAE

21	Lonicera interrupta	1051
22	Symphoricarpos acutus	1049
23	S. albus(=S. rivularis)	1049

11. CARYOPHYLLACEAE

24	Arenaria congesta var. subcongesta	281
25	Cerastium arvense	277
26	Sagina saginoides var. hesperia	278
27	Silene douglasii	291
28	S. lemmonii	290

12. COMPOSITAE

29	Achillea lanulosa	1229
30	Adenocaulon bicolor	1239
31	Agoseris glauca var. monticola	1292
32	Artemisia arbuscula	1235
33	Balsamorhiza sagittata	1086
34	Chaenactis douglasii	1154
35	Chrysopsis breweri	1170
36	Chrysothamnus nauseosus ssp. albicaulis	1191
37	Cirsium sp.	
38	*C. arvense	1280
39	Crepis modocensis ssp. subacaulis	1308
40	Erigeron inornatus var. inornatus	1219
41	Eriophyllum lanatum var.	1146
42	Eupatorium occidentale	1268
43	Haplopappus bloomeri	1179
44	Helianthella californica var. nevadensis	1191
45	Helenium bigelovii	1139
46	Hieracium albiflorum	1305
47	Lessingia nemaclada	1222
48	Microseris sp.	
49	Senecio integerrimus var. major	1248
50	S. triangularis	1248
51	Stephanomeria tenuifolia	1296
52	*Taraxacum officinale	1310
53	Wyethia mollis	1085

13. CONVOLVULACEAE

54	Convolvulus malacophyllus	461
55	C. sp. malacophyllus x polymorphus??	

14. CORNACEAE

56	Cornus nuttallii	1035
57	C. sessilis	1035
58	C. stolonifera	1034

15.	CRASSULACEAE	
59	Sedum spathulifolium	727
16.	CRUCIFERAE	
60	Arabis breweri	262
61	A. glabra	258
62	A. holboellii var. retrofracta	262
63	Erysimum capitatum	268
64	Nasturtium officinale	240
17.	CUPRESSACEAE	
65	Calocedrus decurrens	59
18.	CYPERACEAE	
66	Carex bolanderi	1443
67	C. jonesii	1441
68	C. multicaulis	1451
69	C. multicostata	1448
70	C. microptera	1444
71	C. nudata	1460
72	C. rossii	1450
73	C. simulata	1438
74	Eleocharis pauciflora var. suksdorfiana	1420
19.	EQUISETACEAE	
75	Equisetum arvense	28
20.	ERICACEAE	
76	Arctostaphylos patula	423
77	A. nevadensis	422
21.	EUPHROBIACEAE	
78	Eremocarpus setigerus	162
22.	FAGACEAE	
79	Chrysolepsis sempervirens(=Castanopsis)	902
80	Quercus chrysolepis	906
81	Q. kelloggii	903
82	Q. vaccinifolia	907

23.	GARRYACEAE	
83	Garrya fremontii	1036
24.	GRAMINEAE	
84	Agrostis exarata	1522
85	Bromus marginatus	1470
86	B. rubens	1474
87	Danthonia unispicata	1516
88	Deschampsia elongata	1513
89	Elymus glaucus	1505
90	Glyceria striata	1481
91	Holcus lanata	1515
92	Melica stricta	1499
93	Muhlenbergia filiformis	1526
94	Stipa californica	1533
95	S. stillmanii	1531
96	Sitanion hystrix	1506
25.	HYDROPHYLLACEAE	
97	Draperia systyla	545
98	Hydrophyllum occidentale	517
99	Nama lobbii	546
100	Phacelia hastata	533
101	P. hydrophylloides	527
102	P. frigida ssp. dasyphylla	534
26.	HYPERICACEAE	
103	Hypericum anagalloides	192
27.	IRIDACEAE	
104	Iris hartwegii	1389
28.	JUNCACEAE	
105	Juncus ensifolius	1412
29.	LABIATAE	
106	Monardella lanceolata	715
107	M. odoratissima ssp. pallida	714
108	Prunella vulgaris ssp. lanceolata	697
109	Stachys rigida ssp. rivularis	700

30. LEGUMINOSAE

110	Lotus grandiflorus	845
111	Lupinus arbustus ssp. silvicola	820
112	L. grayi	822
113	Trifolium longipes	836
114	T. repens	835
115	T. variegatum	840

31. LILIACEAE

116	Calochortus leichtlinii	1351
117	C. invenustus	1352
118	C. minimus	1348
119	Disporum hookeri var. trachyandrum	1332
120	Fritillaria micrantha	1340
121	Lilium humboldtii	1343
122	L. pardalinum	1344
123	L. washingtonianum	1342
124	Smilacina racemosa var. amplexicaulis	1331
125	Veratrum californicum	1335

32. LOASACEAE

126	Mentzelia dispersa	181

33. LORANTHACEAE

127	Arceuthobium campylopodum	990

34. ONAGRACEAE

128	Clarkia purpurea	940
129	Circaea alpina var. pacifica	961
130	Epilobium oregonense	931
131	E. paniculatum	926
132	Gayophytum diffusum ssp. parviflorum	958

35. ORCHIDACEAE

133	Corallorhiza maculata	1400
134	Habenaria dilatata var. leucostachys	1396
135	H. unalascensis	1396
136	Goodyera oblongifolia	1399

36. PINACEAE

137	Abies concolor	49
138	A. magnifica	50

36. PINACEAE (continued)

139	Pinus lambertiana	52
140	P. ponderosa	53
141	P. jeffreyi	54
142	P. monticola	52
143	Pseudotsuga menziesii	57

37. POLEMONIACEAE

144	Collomia tinctoria	473
145	Gilia sp.	
146	Gilia capitata	480
147	Ipomopsis aggregata	492
148	Leptodactylon pungens ssp. hookeri	506
149	Phlox diffusa	477

38. POLYGONACEAE

150	Eriogonum lobbii	338
151	E. microthecum (ssp. ?)	347
152	E. nudum var. deductum	352
153	E. spergulinum var. reddingianum	341
154	E. vimineum	345
155	E. ursinum	339
156	Rumex acetosella	356
157	*R. crispus	358

39. POLYGALACEAE

158	Polygala cornuta	156

40. PORTULACACEAE

159	Calyptridium umbellatum	305
160	Montia hallii	302
161	M. spathulata	303

41. PTERIDACEAE

162	Adiantum pedatum	38
163	Cryptogramma acrostichoides	37
164	Pellaea andromedaefolia	36
165	Pteridium aquilinum var. pubescens	32
166	Pityrogramma triangularis	37

42. PYROLACEAE

167	Chimaphila menziesii	435
168	C. umbellata ssp. occidentalis	435
169	Pterospora andromedea	436
170	Pyrola picta	434

42. PYROLACEAE (continued)

171	Pyrola picta f. aphylla	434
172	P. p. ssp. dentata	434
173	Sarcodes sanguinea	436

43. PRIMULACEAE

174	Trientalis latifolia	404

44. RHAMNACEAE

175	Ceanothus cordulatus	978
176	C. integerrimus	977
177	C. prostratus	984
178	Rhamnus rubra ssp. obtusissima	973

45. ROSACEAE

179	Amelanchier pallida	793
180	A. utahensis	793
181	Horkelia tridentata	764
182	Holodiscus microphyllus	759
183	Potentilla glandulosa ssp. reflexa	775
184	Prunus emarginata	789
185	Rosa gymnocarpa	788
186	Rubus leucodermis	785
187	R. parviflorus	785
188	Sorbus californica	792
189	Spiraea douglasii	757

46. RUBIACEAE

190	Galium bolanderi	1042
191	G. hypotrichium	1045
192	G. triflorum	1040
193	Kelloggia galioides	1045

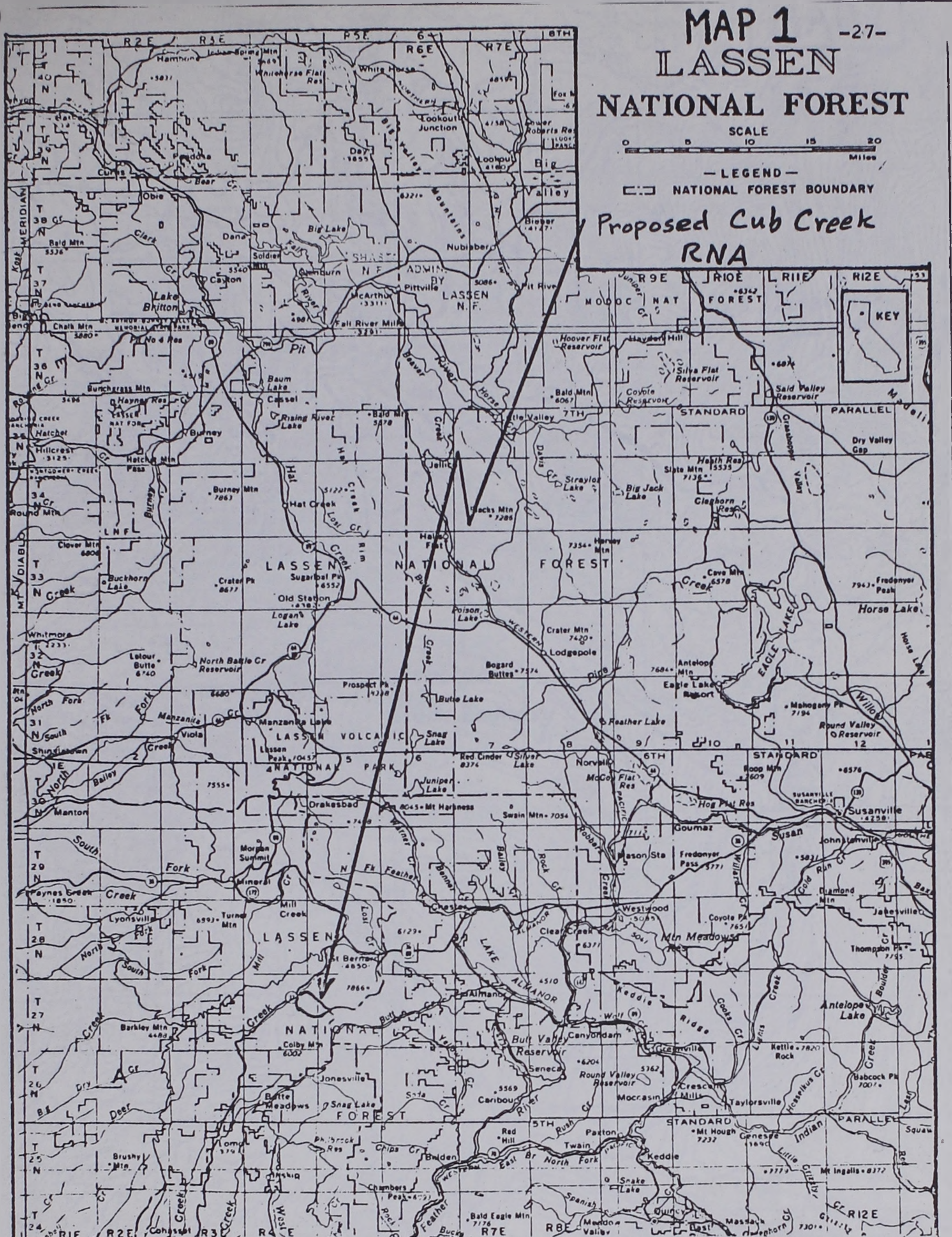
47. RANUNCULACEAE

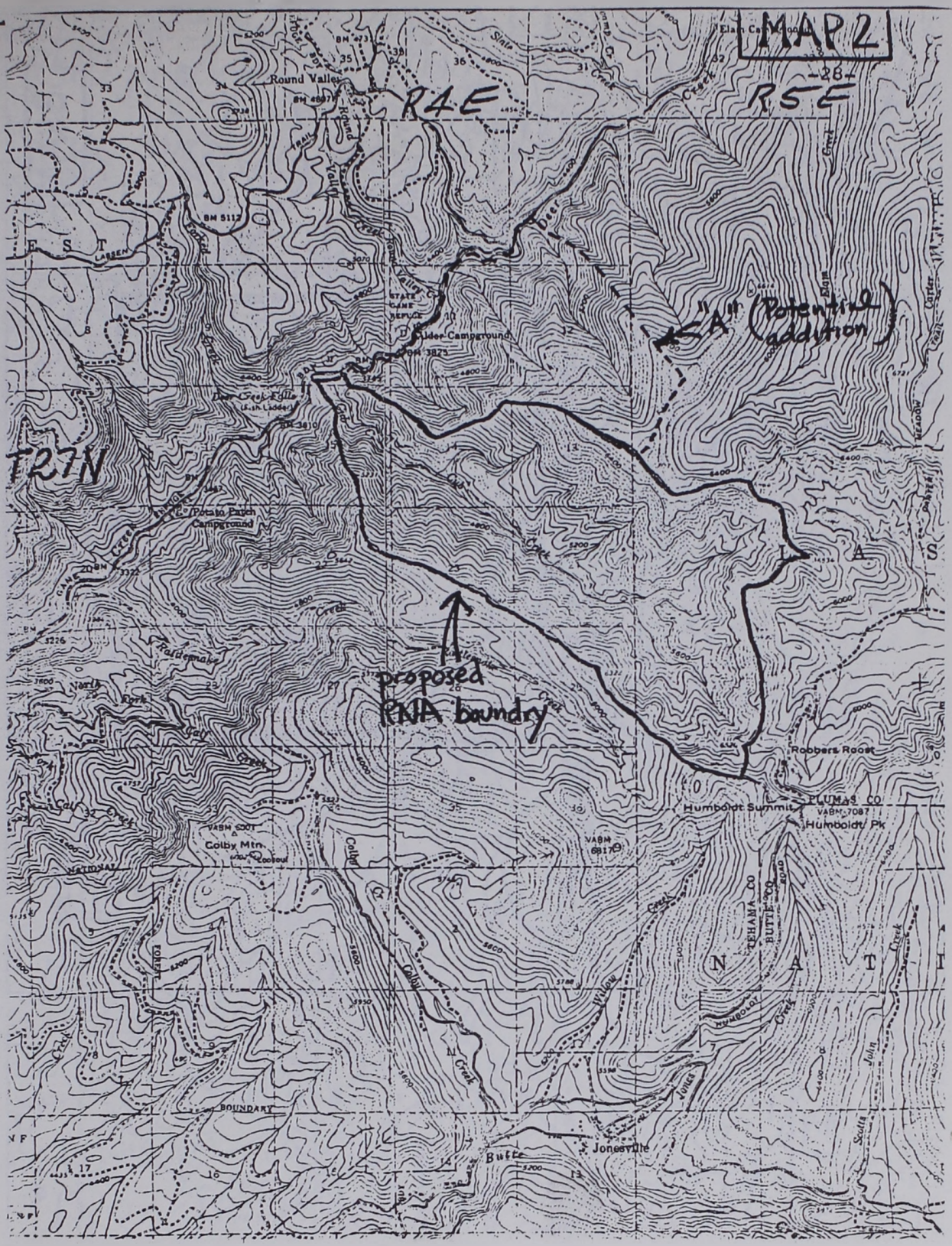
194	Aquilegia formosa var. truncata	105
195	Delphinium nuttallianum	85
196	Thalictrum fendleri	106
197	Ranunculus occidentalis var. ultramontanus	94

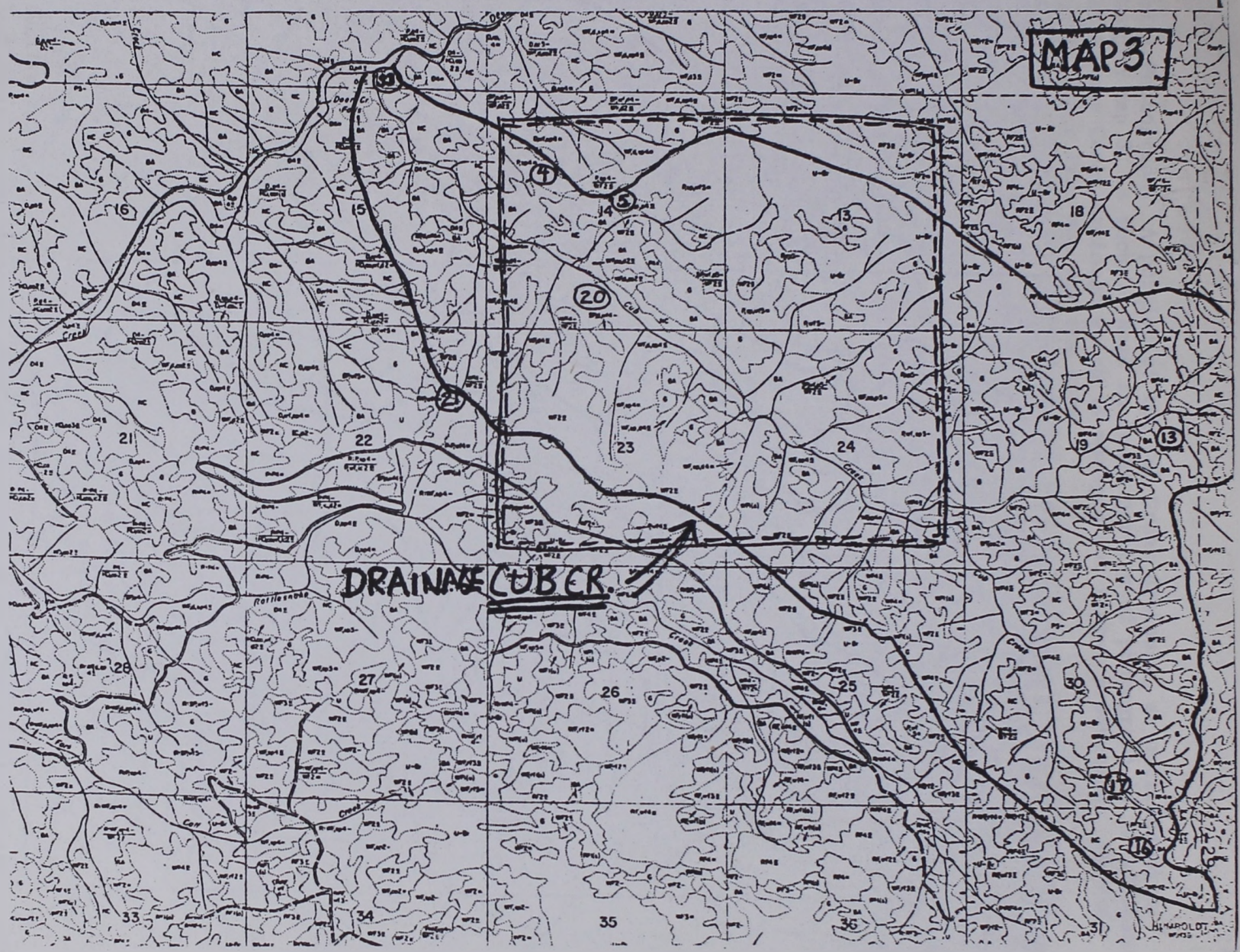
48. SALICACEAE

198	Populus trichocarpa	910
199	Salix lasiolepis	915
200	S. scouleriana	918

49.	SAXIFRAGACEAE	
201	Lithophragma parviflora	738
202	Heuchera rubescens var. glandulosa	743
203	Peltiphyllum peltatum	733
204	Ribes nevadense	748
205	R. roezlii	753
206	R. viscosissimum var. hallii	748
207	Saxifraga punctata ssp. arguta	734
208	Tellima grandiflora	739
50.	SCROPHULARIACEAE	
209	Castilleja cf. applegatei	670
210	Mimulus cardinalis	610
211	M. guttatus	616
212	M. primuloides var. pilosellus	611
213	M. moschatus	610
214	Pedicularis densiflora	658
215	Penstemon breviflorus	640
216	P. deustus	632
217	P. gracilentus	637
218	P. laetus	638
219	P. newberryi	640
220	Veronica americana	656
51.	SOLANACEAE	
221	Chamaesaracha nana	593
52.	TAXACEAE	
222	Torreya californica	65
53.	UMBELLIFERAE	
223	Lomatium macrocarpum	1024
224	Osmorhiza chilensis	1009
225	O. occidentalis	1008
226	Periderida bolanderi	1013
227	Pteryxia terebinthina var. californica	1029
228	Sanicula tuberosa	1006
54.	VIOLACEAE	
229	Viola adunca	190
230	V. lobata	185
231	V. purpurea ssp. mesophyta	187

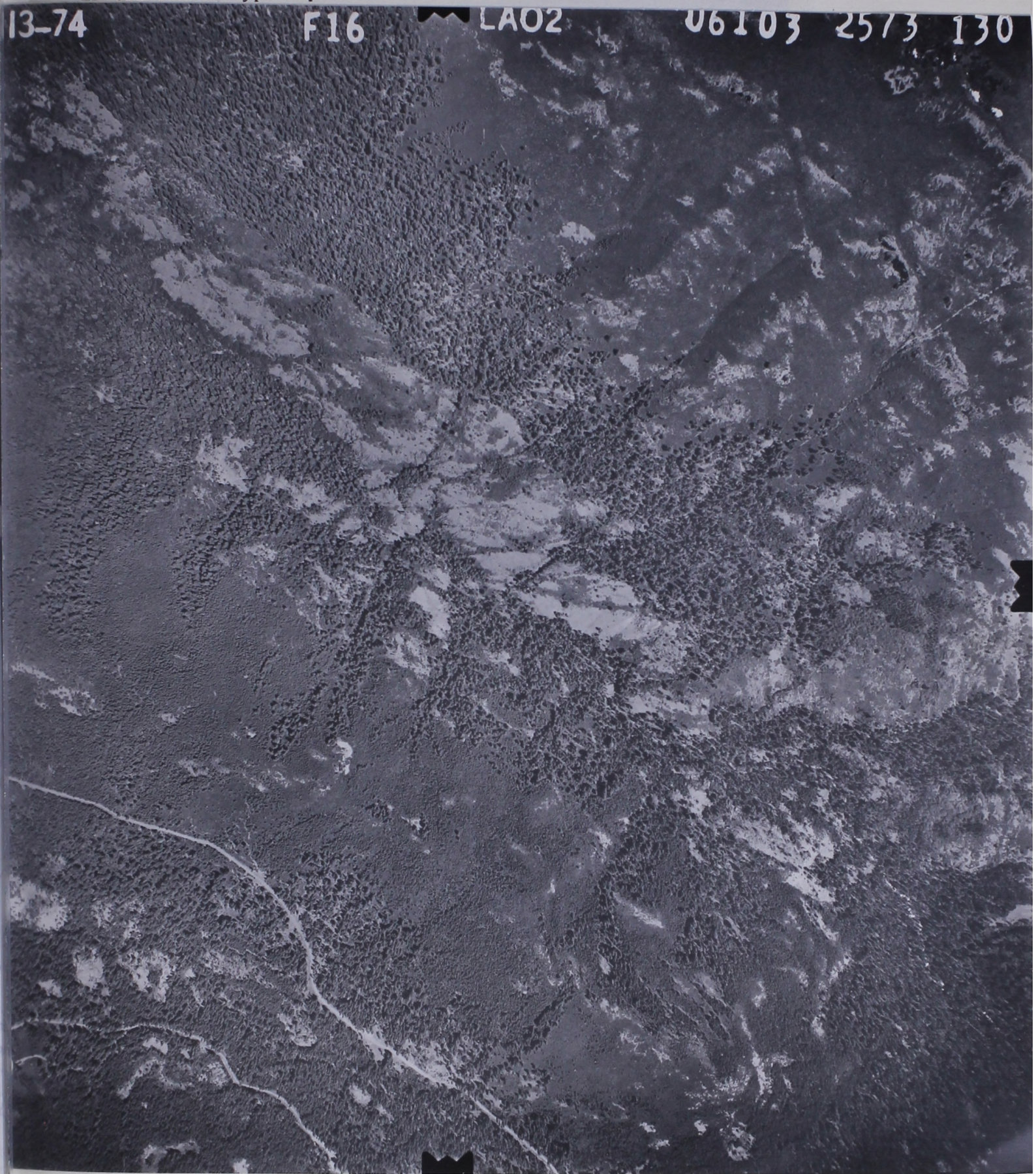

MAP 1
LASSEN
NATIONAL FOREST
SCALE
0 5 10 15 20
Miles
— LEGEND —
NATIONAL FOREST BOUNDARY
Proposed Cub Creek
RNA
KEY
LASSEN NATIONAL FOREST
LASSEN VOLCANIC NATIONAL PARK
LASSEN NATIONAL FOREST
SHASTA N.F. ADMIN. BY LASSEN N.F.
MODOC NAT FOREST
Susanville
Westwood
Chester
Lake Almanor
Eagle Lake
Burney
Quincy


MAP 2
R4E
R5E
T27N
"A" (Potential addition)
proposed RNA boundry
Round Valley
Deer Creek
Elder Campground
Potato Patch Campground
Rattlesnake
North Fork
Grey Creek
Colby Mtn.
Colby Cr.
Willow Creek
Humboldt Summit
Humboldt Pk
Robbers Roost
Jonesville
Butte
Scotts
John
Jones
BOUNDARY
PLUMAS CO
TEHAMA CO
BUTTE CO
N A T H
E S T
LASSEN


MAP 3
DRAINAGE CUBER.

Aerial Photograph. A portion of the Cub Creek drainage, as outlined with a box on Map 3, is shown. Road in lower portion of photograph is in adjacent Rattlesnake Creek drainage which is managed for timber production. Overlay is the Timber Type Map for the area.

Aerial Photograph. A portion of the Cub Creek drainage, as outlined with a box on Map 3, is shown. Road in lower portion of photograph is in adjacent Rattlesnake Creek drainage which is managed for timber production. Overlay is the Timber Type Map for the area.



Photographs of the Cub Creek area.

Figure 1. View of the Cub Creek drainage taken from the east side of the watershed looking upstream. Forest on opposite side of creek is a mosaic of Pinus ponderosa-Pseudotsuga menziesii-Calocedrus decurrens and Abies concolor communities.

Figure 2. View of the southwest-facing slopes at the head of Cub Creek. Montane chaparral alternates with patches of Abies concolor-Abies magnifica reproduction. Arctostaphylos patula and Ceanothus integerrimus dominate the chaparral. Cliffs are formed from resistant volcanic rocks. Barren areas within the chaparral are vegetated by the Sitanion hystrix-Chrysothamnus nauseosus association.

Figure 3. Dense, old-growth Pseudotsuga menziesii-Cornus nuttallii forest at the junction of Cub Creek with Deer Creek.

Figure 4. Dense Abies concolor reproduction under old-growth Pinus ponderosa-P. lambertiana canopy on the west-facing slope of the Cub Creek drainage (Plot 4).